10th Class 2019

Chemistry	Group-II	Paper-II
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) Define forward and reverse reaction.

Ans **Forward Reaction:**

It is a reaction in which reactants react to form products.

Reverse Reaction:

It is a reaction in which products react to produce reactants.

(ii) What do you mean by equilibrium constant?

Ans At equilibrium rate:

The rate of forward reaction = The rate of reverse reaction

$$k_f [A][B] = k_r [C][D]$$

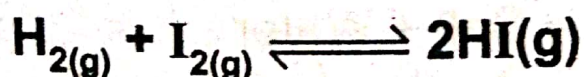
$$\frac{k_f}{k_r} = \frac{[C][D]}{[A][B]}$$

Where $K_c = \frac{k_f}{k_r}$

K_c is called equilibrium constant. It is represented as:

$$K_c = \frac{[C][D]}{[A][B]}$$

(iii) Write the equilibrium constant expression for the reaction:

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI(g)$$

Ans The rate of forward reaction $R_f = K_f [H_2] [I_2]$

The rate of reverse reaction $R_r = K_r [HI]^2$

The equilibrium constant expression

$$K_c = \frac{[Product]}{[Reactants]}$$

$$K_c = \frac{[HI]^2}{[H_2][I_2]}$$

(iv) What is dynamic equilibrium state?

Ans Dynamic equilibrium state is one at which reaction does not stop, rate of forward and reverse reactions become equal to each other but take place in opposite direction.

(v) Write limitation of Arrhenious concept.

Ans **Limitations of Arrhenious Concept:**

1. This concept is applicable only in aqueous medium and does not explain nature of acids and bases in non-aqueous medium.
2. According to this concept, acids and bases are only those compounds which contain hydrogen (H^+) and hydroxyl (OH^-) ions, respectively. It can't explain the nature of compounds like CO_2, NH_3, etc. which are acid and base, respectively.

(vi) Write any two physical properties of bases.

Ans Following are the two properties of bases:

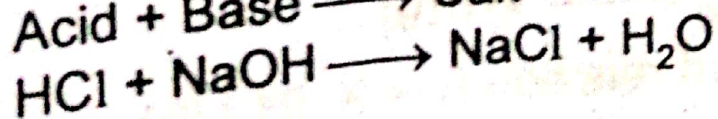
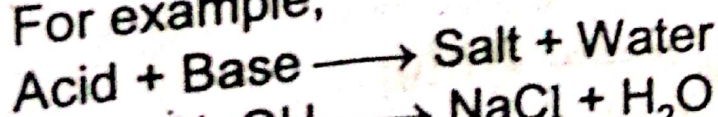
1. Bases have bitter taste and feel slippery, *e.g.*, soap is slippery to touch.
2. They turn red litmus blue.

(vii) Define neutralization reaction. Give an example.

Ans A reaction between an acid and a base is called a neutralization reaction. It produces a salt and water.

For example,

Acid + Base ⟶ Salt + Water

$HCl + NaOH \longrightarrow NaCl + H_2O$

(viii) **What are mixed salts? Give an example.**

Ans Mixed salts contain more than one basic or acid radicals. Bleaching powder Ca(OC*l*)C*l*, is an example of mixed salts.

3. Write short answers to any FIVE (5) questions: 10

(i) **Write down different types of coal.**

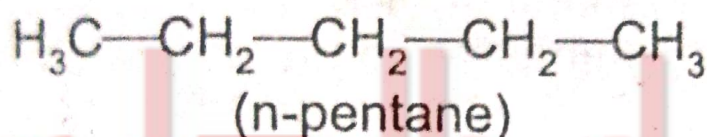
Ans Following are the name of four different types of coal:

1. Peat 2. Lignite
3. Bituminous 4. Anthracite

(ii) **What is isomerism? Give an example.**

Ans The reason for the abundance of organic compounds is the phenomenon of isomerism. For example,

$$H_3C—CH_2—CH_2—CH_2—CH_3$$

(n-pentane)

(iii) **What is structural formula? Give an example.**

Ans Structural formula of a compound represents the exact arrangement of the different atoms of various elements present in a molecule of a substance. In a structural formula, single bond is represented by a single line (–), a double bond by two lines (=) and a triple bond by three lines (≡) between the bonded atoms.

(iv) **What are closed chain hydrocarbons? Give an example.**

Ans Closed chain hydrocarbons or cyclic compounds are those in which the carbon atoms at the end of the chain are not free. They are linked to form a ring. For example, Benzene, Cyclobutane, Cyclohexane or Pyridine etc.

(v) **Why are alkenes reactive?**

Ans Alkenes are reactive compounds because the electrons of the double bond are easily available for reaction. These compounds have the tendency to react readily by adding other atoms, to become more saturated

compounds. As a result, the double bond is converted into a single bond that is more stable.

(vi) Name two diseases caused by deficiency of vitamin A.

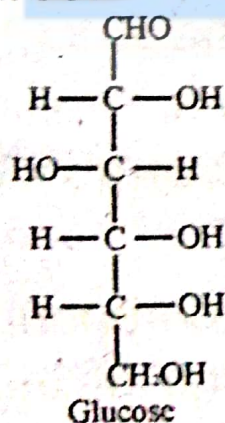
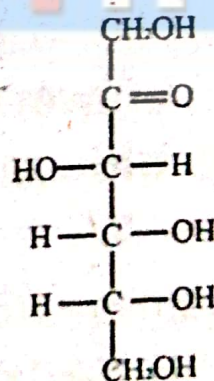
Ans Diseases born by the deficiency of Vitamin A are night blindness and eye inflammation.

(vii) Where are protein found?

Ans

1. Sources of animal's proteins are meat (mutton, chicken, fish) and eggs.
2. Enzymes are proteins that are produced by the living cells.
3. Hides are proteins.
4. Proteins are found in bones.
5. Plants also synthesize proteins, such as pulses, beans, etc.

(viii) What is difference between glucose and fructose?

Ans Glucose is a pentahydroxy aldehyde while the fructose is a pentahydroxy ketone having the open chain structures:

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        CHO                     CH2OH
        |                       |
   H—C—OH                       C=O
        |                       |
  HO—C—H                   HO—C—H
        |                       |
   H—C—OH                   H—C—OH
        |                       |
   H—C—OH                   H—C—OH
        |                       |
      CH2OH                   CH2OH
    Glucose                 Fructose
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4. Write short answers to any FIVE (5) questions: 10

(i) Write the name of two primary air pollutants.

Ans Two primary air pollutants are:

1. Oxides of Sulphur (SO_2 and SO_3).
2. Oxides of Carbon (CO_2 and CO).

(ii) **Write two effects of ozone depletion.**

Ans Following are the two effects of ozone depletion:

(i) Due to the depletion of ozone in the atmosphere, infectious diseases like malaria are increasing.

(ii) It can also change the life cycles of the plants by disrupting the food chains.

(iii) **What is the temperature range of stratosphere and mesosphere?**

Ans **Temperature Range of Stratosphere:**

–58°C — 2°C (increases)

Temperature Range of Mesosphere:

2°C — –93°C (decreases)

(iv) **What is the reason of jaundice and typhoid?**

Ans **Jaundice:**

Jaundice is caused by an excess of bile pigments in the blood. Liver ceases to function and eyes turn yellow. Patient feels weakness and fatigue.

Typhoid:

A dangerous bacterial disease often spread by contaminated water or by food prepared with contaminated water.

(v) **Write two disadvantages of hard water.**

Ans Following are the two disadvantages of hard water:

1. Hard water consumes large amount of soap in washing purposes.
2. Drinking hard water causes stomach disorders.

(vi) Name any two processes which involved in metallurgy for extraction of a metal in the pure state from its ore.

Ans The processes involved in metallurgy for extraction of a metal in the pure state from its ore are:

(i) Concentration of the ore,

(ii) Extraction of the metal.

(vii) Write the formulae of matte and urea.

Ans Formula of Matte: $Cu_2S.FeS$

Formula of Urea: NH_2CONH_2

(viii) Write two advantages of Solvay's process.

Ans Following are the two advantages of Solvay's process:

1. It is a cheap process as raw materials are available at very low prices.
2. Carbon dioxide and ammonia are recovered and reused.

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) State the Law of Mass Action and derive equilibrium constant expression for general reaction. (5)

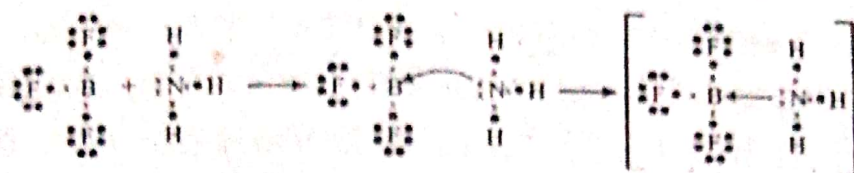
Ans For Answer see Paper 2015 (Group-I), Q.5.(a).

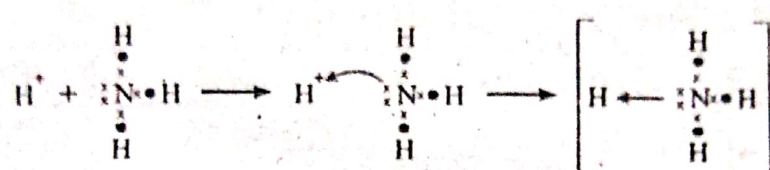
(b) Explain the Lewis concept of acids and bases. (4)

Ans The Arrhenius and Bronsted-Lowry concepts of acids and bases are limited to substances which contain protons. G.N. Lewis (1923) proposed a more general and broader concept of acids and bases. According to this concept:

"An acid is a substance (molecule or ion) which can accept a pair of electrons, while a base is a substance (molecule or ion) which can donate a pair of electrons."

For example, a reaction between ammonia and boron trifluoride takes place by forming a coordinate covalent bond between ammonia and boron trifluoride by donating an electron pair of ammonia and accepting that electron pair by boron trifluoride.

$$BF_3 + :NH_3 \longrightarrow BF_3 \curvearrowleft :NH_3 \longrightarrow [F_3B \leftarrow NH_3]$$

The cations (proton itself or metal ions) act as Lewis acids. For example, a reaction between H^+ and NH_3, where H^+ acts as an acid and ammonia as a base.

$$H^+ + :NH_3 \longrightarrow H^+ \curvearrowleft :NH_3 \longrightarrow [H \leftarrow NH_3]^+$$

The product of any Lewis acid-base reaction is a single specie, called an adduct. So, a neutralization reaction according to Lewis concept is donation and acceptance of an electron pair to form a coordinate covalent bond in an adduct.

Acids are electron pair acceptors while bases are electron pair donors. Thus, it is evident that any substance which has an unshared pair of electrons can act as a **Lewis base** while a substance which has an empty orbital that can accommodate a pair of electrons acts as **Lewis acid**.

Concept	Acid	Base	Product
Lewis	electron pair acceptor	electron pair donor	adduct

Q.6.(a) Write down the uses of acetylene. (5)

Ans Following are three of the uses of Acetylene:

(i) Acetylene produces oxy-acetylene flame with oxygen. It is a highly exothermic reaction. Heat released is used for welding purposes.

(ii) Acetylene is used to prepare other chemicals, such as alcohols, acetaldehyde and acids.

(iii) It is used for the ripening of fruits.

(b) Write down the sources and diseases due to deficiency of some fat soluble vitamins. (4)

Ans **Fat Soluble Vitamins:**

The vitamins which dissolve in fats are called fat soluble vitamins. These are vitamin A, D, E and K. If these vitamins are taken in large quantity, they accumulate in the body and cause diseases. For example, accumulation of vitamin D in the body causes bone-pain and bone-like deposits in the kidney. However, their deficiency also causes diseases.

Table: Sources, uses and diseases due to deficiency of fat soluble vitamins.

No.	Vitamin	Sources	Uses	Diseases
i.	Vitamin A	Dairy products, eggs, oils and fats, fish. It can also be obtained from the betacarotene found in green vegetables, carrots and liver.	Maintains the health of the epithelium and acts on the retina's dark adaptation mechanism.	Night blindness, eye inflammation.
ii.	Vitamin D	Fish liver, dairy products, oils and fats. Vitamin D is formed in the skin when it is exposed to sunlight.	Has a role in the absorption of calcium, which is essential for the maintenance of healthy bones.	Rickets.

Q.7.(a) Explain the process of smelting with reference to copper. (5)

Ans **Smelting:**

It is heating of the roasted ore with sand flux and coke in the presence of excess of air in a blast furnace as shown in the following figure.

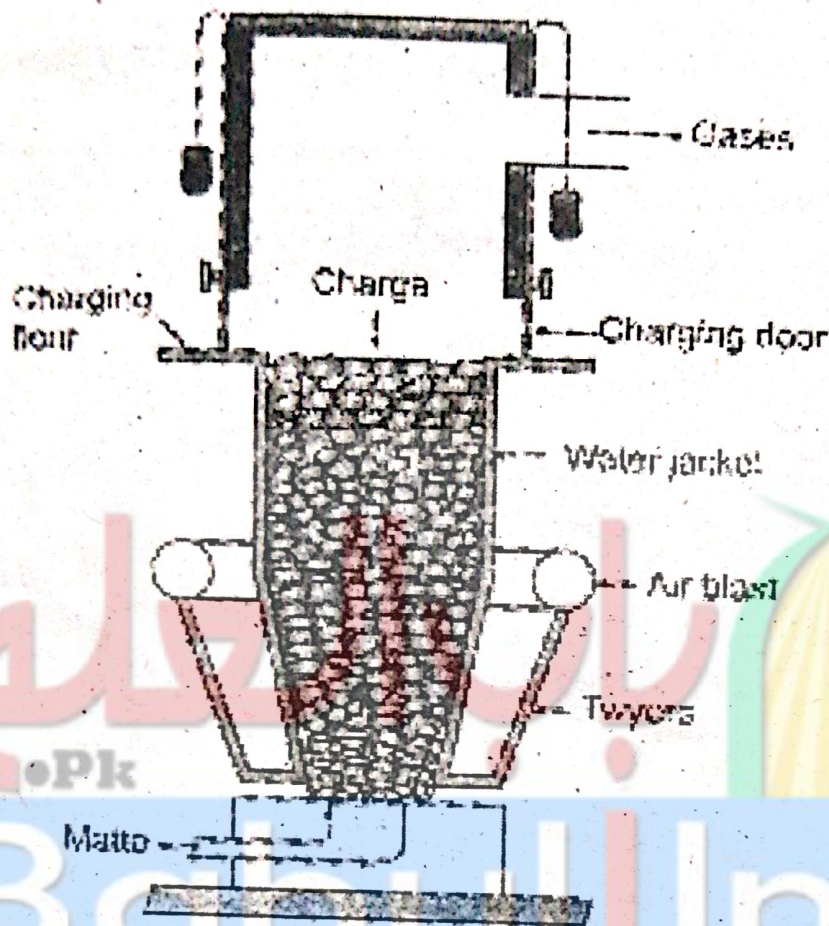
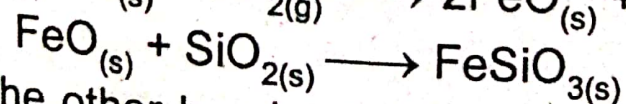
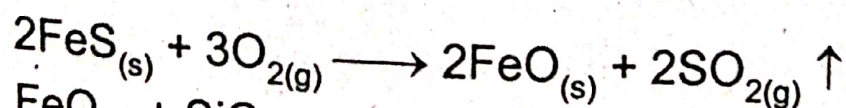



Fig. Blast furnace for smelting of copper.

It is highly exothermic process, therefore, a small amount of coke is required in the process. In the process, first ferrous sulphide oxidize to form ferrous oxide which reacts with sand to form iron silicate slag ($FeSiO_3$). It being lighter rise to the top and is removed from the upper hole.

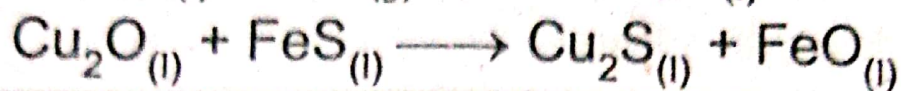
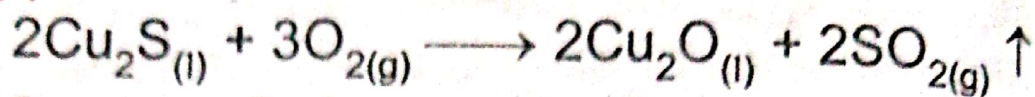
$$2FeS_{(s)} + 3O_{2(g)} \longrightarrow 2FeO_{(s)} + 2SO_{2(g)} \uparrow$$

$$FeO_{(s)} + SiO_{2(s)} \longrightarrow FeSiO_{3(s)}$$

On the other hand, cuprous sulphide also oxidize to form cuprous oxide which reacts with unreacted ferrous sulphide to form ferrous oxide and cuprous sulphide. In

this way, cuprous sulphide and ferrous sulphide form a mixture ($Cu_2S.FeS$). This molten mixture is called matte.

It is withdrawn from the lower hole. It contains about 45% of copper.

$$2Cu_2S_{(l)} + 3O_{2(g)} \longrightarrow 2Cu_2O_{(l)} + 2SO_{2(g)} \uparrow$$

$$Cu_2O_{(l)} + FeS_{(l)} \longrightarrow Cu_2S_{(l)} + FeO_{(l)}$$

(b) Write two methods for the removal of permanent hardness of water. **(4)**

Ans For Answer see Paper 2016 (Group-II), Q.8.(a).